The rejection contends that the limitations of claim 1 are met by the combination of Gyoten et al. and Stonehart et al., alleging that Gyoten et al. teach chemically bonding a silane compound to the surface of the catalyst particle or a carrier of the catalyst particle, and that it would be obvious to add silica as described in Stonehart et al. to satisfy the limitations of the claimed invention. The rejection further contends that Applicants have not provided evidence that Gyoten et al. and Stonehart et al. would not produce similar results as the claimed invention. Applicants respectfully disagree with the rejection and contend that for at least the following reasons the claimed invention provides a materially different product than the prior art, resulting from the process limitations of claim 1.

In support of the patentability of the claims, Applicants respectfully submit herewith a Rule 1.132 Declaration by Aoi Muta, who is a Chief engineer for the Assignee of this application. The Declaration demonstrates that higher densities of an ion-conducting functional group would be expected in the catalyst layer, when the ion-conducting functional group is first bonded to the surface of silica and then mixed with the catalyst particles. Such a result can be obtained because more ion-conducting functional groups can bond to the other particles than to the catalyst particles. For example, the density of hydroxyl groups on a silicon oxide surface can be 4.9 nm^{-2}, such as when vacuum treated at lower temperatures (see Table 1 of Zhuravlev, *Concentration of Hydroxyl Groups on the Surface of Amorphous Silicas*, Langmuir 1987, 3, 316-318). Furthermore, the density of hydroxyl groups on a silicon oxide surface is generally in the range of 4.2-5.7nm^{-2} in an initial fully hydroxylated state (see Zhuravlev at page 317, left column, second full paragraph).

In contrast, lower densities of an ion-conducting functional group are expected when the ion-conducting functional group is first bonded to the catalyst particles, rather than other inorganic particles such as silica. The Declaration provides that a density of no higher than 1.48nm^{-2} is achieved, for example when ion-functional groups are first bonded on the surface of a platinum-carrying carbon catalyst.

Thus, the bonding density of ion-conducting functional groups on other inorganic particles, such as silica oxide, can be about three times higher than the bonding density of ion-conducting functional groups on the catalyst particles.

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Turning specifically to Gyoten et al. and Stonehart et al., the references at least do not disclose or suggest a catalyst layer obtained by chemically bonding a molecule comprising an ion–conducting functional group serving as an electrolyte to a surface of the other particles and then mixing the other particles and the catalyst particles. As Gyoten et al. merely discloses chemically bonding a silane compound to the surface of the catalyst particle or a carrier of the catalyst particle, the reference would only achieve a bonding density of $1.48nm^{-2}$ or lower. While Stonehart et al. discloses silica, the mere presence of silica does not remedy the deficiencies of Gyoten et al. That is, nothing in either reference discloses or suggests chemically bonding an ion-functional group to a surface of other inorganic particles and then mixing the other inorganic particles (with the ion-functional group bonded thereto) and the catalyst particles. Rather, the Gyoten et al. bonds silane to the catalyst or a carrier of the catalyst and Stonehart et al. simply discusses the presence of silica but does not disclose or suggest that the silica is bonded to the silane before mixing with the catalyst particles. Applicants respectfully contend that without more, the references fail to satisfy claim 1 for at least the foregoing reasons.

Moreover, the fuel cell of claim 1 can provide advantageous results where catalyst layer performance is enhanced. In accordance with claim 1, the molecule containing an ion-conducting functional group can bond firmly to the surface of the other particles. Thereafter, the other particles and the catalyst particles are mixed. (See e.g. Fig. 6.) As a result, the surface of the inorganic particles can have higher densities of ion-conducting functional groups to which the molecule can be chemically bonded. That is, more molecules containing an ion-conducting functional group can be bonded to the surface of the inorganic particles. (See for example page 7, lines 8-14 of Applicants' disclosure.) Accordingly, an effective reaction area for the catalyst can be increased, thereby permitting higher voltages, since fewer electrolytes are eluted from the catalyst layer. (See voltage results shown in Tables 2 and 3, for example unit cells 3-8, and page 20 of Applicants' disclosure.) Even if Gyoten et al. and Stonehart can be combined, which Applicants do not concede, there is no reasonable suggestion that the references would arrive either at the features of claim 1 or the advantages that may be enjoyed by claim 1.

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Thus, claim 1 is not obvious and is patentable over Gyoten et al. and Stonehart et al. for at least the foregoing reasons. Claims 2-7, 10-13, 16, 19, and 20 depend upon and further limit claim 1 and are patentable for at least the same reasons with respect to claim 1.

Favorable reconsideration and withdrawal of the rejection are respectfully requested.

In view of the above amendments and remarks, Applicants believe that the pending claims are in a condition for allowance. Favorable consideration in the form of a Notice of Allowance is respectfully solicited. If any questions arise regarding this communication, the Examiner is invited to contact Applicants' representative listed below.

Respectfully submitted,

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PATENT TRADEMARK OFFICE

HAMRE, SCHUMANN, MUELLER & LARSON, P.C.
P.O. Box 2902
Minneapolis, MN 55402-0902
(612) 455-3800

Dated: July 31, 2008

By: ____________________
Douglas P. Mueller
Reg. No. 30,300
DPM/baw/mkc

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